



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/IT99/00074 <b>(22) International Filing Date:</b> 30 March 1999 (30.03.99) <b>(30) Priority Data:</b> MI98A000675      31 March 1998 (31.03.98)      IT <b>(71)(72) Applicant and Inventor:</b> RENNA, Egidio [IT/IT]; Via Bonito, 32, I-80129 Napoli (IT).		<b>(81) Designated States:</b> AL, AU, BA, BB, BG, BR, CA, CN, CU, CZ, EE, GE, HR, HU, ID, IL, IS, JP, KP, KR, LC, LK, LR, LT, LV, MG, MK, MN, MX, NO, NZ, PL, RO, SG, SI, SK, SL, TR, TT, UA, US, UZ, VN, YU, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> SPECTACLES FRAMEWORK WITH EARPHONE BARS  <b>(57) Abstract</b>  <p>The present invention relates to spectacles, and in detail to an improved spectacles framework with increased functions of the type including sound diffusion means mounted at one end of pivoting or hinged bars arranged on the arms, so as to make it possible that the sound diffusor (earphone), by pivoting the bars, is positioned in front of the corresponding auditory meatus, thus enabling the wearer to listen to music or to any audio message coming from a cassette-player, CD-player, radio, computer, TV, etc.; particularly the listening device system consists of a FM receiver in UHF band (e.g. 433,1; 433,2; 433,3 mhz) embedded in each bar, tuned to an FM transmitter in UHF band connected to the sound generator.</p> <div data-bbox="800 1163 1398 1703" data-label="Image"> </div>		

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DescriptionSpectacles framework with earphone bars

5 The present invention relates to spectacles, and in detail to an improved spectacles framework with increased functions of the type including sound diffusion means mounted at one end of hinged bars arranged on the arms of the spectacles, so as to make it possible that the sound diffusor (earphone), by pivoting the bars around the pin connecting the same bars and the arms of the spectacles, is positioned in front of  
10 the corresponding auditory meatus, thus enabling the wearer to listen to music or to any other audio message delivered by a cassette-player, CD-player, radio, computer, TV, etc., either connected by means of a jack or with a wireless communication system.

The bars and relevant earphones can be either connected to the spectacles arms in  
15 several different ways or can include within themselves an improved receiving system tuned to one single FM transmitter, transmitting in UHF transmission band (e. g. 433,1 433,2 433,3 mhz), stereophonic, to be connected to the sound generator (cassette player, CD player, etc.).

As an example, preferably, however not exclusively, one miniaturized FM receiver  
20 connected to the right channel and disconnected from the left one, tuned to the same frequency as the transmitter, will be embedded in the right bar that is hinged to the right arm of the spectacles, and in the left bar, hinged to the left arm of the spectacles, will be a receiver connected to the left channel and disconnected from the right one, tuned to the same frequency as the transmitter.

25 Each bar includes a chip made according to modern miniaturization technologies, SMD (Surface Mounting Device) or 'thick film' chip, powered by microbatteries connected thereto, such bars being then connected to the arms of the framework that is conveniently shaped for lodging the bar.

A stereo-transmitter, that is provided with its own power supply by means of batteries  
30 and can be powered by mains supply as well, and also providing an internal charging device for its own batteries and for the batteries of the receivers that are contained

within the bars, will transmit the sound to the bars and to the corresponding earphones.

The bars, or just the battery housings, if they are separated from the bars, can be detached from the spectacles arms and inserted into said transmitter for charging,  
5 provided it has been connected to the mains supply.

According to aesthetic and manufacturing requirements, some composing elements can be inserted within the arm of the spectacles and suitably connected to the pivoting bar by means of a jack connection consisting of a male (on the bar) and a female on the arm of the spectacles. At least one bar, however preferably both of them, shall be  
10 provided with ON/OFF, tuning, volume (ON/OFF circuit) controls for fine-tuning the receivers to the transmitter and adjusting sound quality.

The interesting result of this invention is therefore the integration of an audioreceiving system, wireless or not, with the aesthetic features of the framework by means of the pivoting bars which are aesthetically integral with the frame while not in use,  
15 however, when the user wants to listen to music, he just has to turn the bars positioning them easily in front of the auditory meatus, in order to listen to music, provided the system is connected as required.

It is also possible to employ FM receivers, receiving in radio band, for simply listening to the radio.

#### Brief Description of the drawings

Some examples of realization are indicatively, however non limitatively shown in the stylized non-scale drawings, where:

Figures 1 and 1a show a pair of spectacles in which a frame according to this  
25 invention is provided with the bar in two positions respectively: storage position and working position;

Figures 2 and 2a show a side view of one arm of the spectacles with the earphone-containing bar respectively in working and storage position (wireless version);

30 Figure 3 is a partially transparent side view of one arm of the spectacles with earphone-containing bar in storage position (variant with wires inside);

Figure 3a is a partially transparent view of the bar of Fig. 3 alone;

Figure 4 is a partially transparent side view of one arm of a pair of spectacles with earphone-containing bar in storage position (wireless version);

Figure 4a is a partially transparent view of the arm of fig. 4 alone;

5 Fig. 5 is an example of slot and bar protrusion system to grant retaining in the arm;

Fig. 6 is a partially transparent side view of an execution form of the framework arm according to this invention, highlighting an example of battery housing;

Figures 7 and 7a depict a variant of the coupling means between the earphone-containing bar and the arm of the spectacles framework, respectively with  
10 the bar in storage and in working positions;

Figure 8 in A and B shows a variant with telescopic earphone-containing bar;

Figure 9 shows a sound producing device with attached FM transmitter;

Figure 10 shows the wire supporting profile to fit in the spectacles framework;

Figure 11 shows the transmitter (its external casing);

15 Figure 12 shows the transmitter and relevant circuitry;

Figure 12a shows the transmitter during battery charge through the bars (working as a battery charger);

Figures 13 and 13a show a pair of spectacles consisting of a frame according to the present invention with the earphone-containing bar respectively in storage and in  
20 working positions;

Figure 14 shows the bars embedding the FM receiver in UHF band (e.g. 433,1 433,2 433,3 mhz) and suitable arms to hold them secure;

Figure 14a shows an example of how the receiver-embedding bars can be executed;

Figures 15 and 15a show a formed protrusion of the earphone;

25 Figure 16 shows an example of shape of the arms.

#### Description of the preferred embodiment

As illustrated in the attached drawings, the spectacles according to this invention are characterized in that they include bars (1), hinged to the arms (2) of the frame, at one end provided with means for a local diffusion of sound consisting of earphones (3).

30 The bars (1), besides being equipped with a sound diffusor or earphone (3), are also provided with means for receiving the sound originating from a sound producing

device, such as a cassette-player, a CD-player, a tuner, a computer, TV or other, and with means permitting to supply electric power to said sound receiving and locally diffusing means.

To help listening at best and positioning each earphone (3) ergonomically into the  
5 corresponding auditory meatus, each earphone can present a formed protrusion (Figures 15 and 15a). In closed position, the bars (1), differently from other solutions, form the profile of the design of the spectacles frame and are pivoted or hinged to the relevant arms (2) of the spectacles. These same bars can be pivoted by the user who releases them from the specific retaining means provided to this purpose, for instance  
10 consisting of adequately shaped seats (2a, 2b, 2c) obtained in the arm of the spectacles and having the same dimensions as the earphone, suitable to contain it when the bar is not in use, or else obtained by suitably shaping the free end of the arm, thus forming a suitable protrusion that will engage a corresponding recess obtained in the arm of the spectacles like for instance in Figure 5. The same bars can bear raised  
15 points such as outside surface embossings that can be of help when the user seizes them with his fingers.

The earphone can also be articulated in the zone where it joins the bar (1), so that the user can at will establish the distance from his auditory meatus.

The bars (1) bearing the earphone (3) can be hinged to the arms like  
20 downward-oriented 'antennas', superimposed and pivoted or hinged, for example with a snap device, to those same arms. The bars (1) can also be constructed with such a material as to grant their articulateness in order to obtain an easy mobility of said arms, and hence a perfect positioning of the earphones at the user's will.

The inside of the bars (1) embeds a earphone (3) in the end zone, whereas at the other  
25 end they are equipped with means engaging the arms of the spectacles, such engaging means consisting either of shaped pivots (1a) or of coaxial couplers (1b), the latter ones acting as coupling devices between the bars and the arms and as electronic connection between the components when provided within the frame of the spectacles (Figures 3a, 4a).

30 The lead-wired version (Figures 3, 3a, 10, 10a) i.e. the spectacles providing physical connection to the sound producer, includes a lead (4) connecting the earphones,

embedded in the upper zone of the frame and presenting the socket that will receive an external jack at one end (4a), and simply ends with the second earphone at the other end.

In case of lead-wiring, where the word 'lead' means any type of electric conductor, the leads connect the earphones to one another passing through the entire perimeter of the arms and brow portion of the spectacles.

In the zones where a pivoting movement is required, i. e. at both sides of the brow portion where it couples with the arms, and in the zone where the bars are supposed to pivot on the arms, the connection leads preferably employ a hinged coupling consisting of a jack 'male' (1b) coupled with the corresponding 'female' (1c). In the lead-wired version, with the aim of making the execution easier and reducing the production costs, for the electric system it is possible to employ an assembly method in which the connection leads ending with the hinge jack will be firstly assembled within a supporting piece (5) made of rubber, or plastic, or metal, and in a second time this supporting piece will be fixed to the frame by snapping or pressing on the frame itself that will be conveniently formed with the corresponding recesses (Figures 10 and 10a)

The point where the bar (1) is hinged to the spectacles arms by means of a pivot around which it is pivoted for lowering and reaching the position in front of the auditory meatus, corresponds to the end opposite the one where the earphone (3) is present; the bar, when not in use, can be kept in line with the spectacles arm by means of a suitable mechanism, such as for instance a return spring .

The outer surface of the bar can be provided with engaging means (not shown), such as a microlever or other means, favouring its downward movement to reach the working position near the ear and to bring it again to its storage position.

The arms can alternatively be flexible, thus offering the best adjustable adherence to the temples, without interrupting the continuity of the remaining part of the frame.

The hinged bars can pivot either clockwise or anticlockwise and the operation of placing the earphone (3), that is present at the end of the bar (1), in the best position, closest to the ear, can be favoured through some suitable mechanisms improving its functionality, among which, for instance, suitable telescopic supports (1F) that can be

pulled out of the bars (Fig. 8).

The bar (1) supporting the earphone (3), when not in use, either lays adjacent the arm of the spectacles, or is partially covered by it, or is embedded within its thickness, thus emerging for a minimum part only from said surface, depending on the aesthetic effects wished by the manufacturer; it can be also placed in any position over the top surface of the arms of the spectacles, whereas its switching-off will be assured through any suitable retaining means (Figures 1, 1a, 2, 2a, 13, 13a).

The same bars can be hinged to the sides of the spectacles arms, so as to enable a sort of 'door' movement when passing from rest position to use position and vice versa by means of an out of center spring (Figures 13, 13a).

Moreover the bars can be equipped with engaging means, suitable to confer them a tilting and subsequently turning movement for granting the passage from rest position to use position and vice versa.

Not least, to facilitate the positioning of the earphone in line with the corresponding auditory meatus, each bar can be functionally coupled to a multi-recess slot (6), provided in the arm of the spectacles, to enable a longitudinal shifting of the same bar (Figures 7, 7a, 14, 14a).

As an advantage, when the connection system between earphones and audio source is executed by means of leads or equivalent means, the lead (5a), provided with end jack for its connection to the audio source (cassette-player, CD-player, or other), when not in use, is received inside the framework, preferably within one of the arms, wound on a reel equipped with return spring means.

As a further advantage, the means providing electric supply, consisting of microbatteries (B), are lodged within the bars in suitable housings and/or detachable containers (9) provided to this purpose.

Not least, the stereo FM transmitter (8), transmitting in UHF transmission band, for instance 433 mhz, is powered by means of miniaturized batteries and/or through the mains supply, includes a charger for charging its own batteries and those in the bars and is provided with a case ending with an output jack (10) to be plugged into the sound producing device (cassette-player, CD-player and other), so that the same transmitter can transmit in such a frequency that can be received by the receivers (R)



that are embedded within the bars (Figures 12, 12a, 14a).

It is finally possible to imagine a use of the invention, equipped with special restful lenses and with a microphone system in addition, possibly passing behind the ear, to reach the mouth at a certain distance when using a computer and its multimedia applications in which sound is employed. It is moreover provided that a transistor radio or other sound/audio generators can be possibly housed within the frame.

It must be particularly highlighted how comfortable is the use of built-in earphones, i.e. integrated within the framework insofar as they are embedded in the bars, that can be easily controlled and kept practically hidden when in storage position and that, by pivoting downwards, can be positioned in front of the auditory meatus, ready for sound diffusion.

The bars can be executed in the form of two semicases or semibodies prepared for housing the electronic components (Fig. 14a), in which case, after embedding the electronic components, the two semicases or semibodies are assembled and welded to each other and connected to the spectacles arms that are suitably preformed to receive them (Figures 14, 14a).

The fact that the FM receivers in UHF (e.g. 433,1 433,2 433,3 mhz) are embedded in the bars represents a particularly functional solution meeting the need for simplifying and optimizing the production: in this way the electronic parts are embedded within the special bars, whereas the framework just has to provide suitable recesses in the arms, as previously described, receiving the bars (fig.14). Some suitable keys (1e) controlling the operation of the receiver and its tuning to the transmitter are located on the bar.

In the bar pivoting pivot there is an embedded conductor which, besides pivoting within the slot provided to this purpose, also executes the function of charging microbatteries once plugged in the charger provided to this purpose. This function can be preferably included within the transmitter case and operated through mains supply, for which an input is provided in the transmitter (11a) to charge the batteries pertaining to the receiver and those pertaining to the transmitter (Figure 12a).

The transmitter, which, we remind, is powered by miniaturized batteries that make it 'portable', is plugged, by means of the jack (10) at its end, into the 'earphone' socket

of the cassette-player, CD-player, etc. (Figure 9), is switched on and transmits the sound coming from the cassette-player, CD-player, etc. in UHF transmission band ( e.g. 433,1 433,2 433,3 mhz) to the receivers included in the bars.

5 The wearer of the invention can pivot the earphone bars, tune the receivers to the UHF (e.g 433,1 433,2 433,3 mhz) frequencies of the transmitter and listen to music. In this way he can listen to the music he likes best from his spectacles, for example sun spectacles, in total freedom of movement. From this point of view the present invention can result particularly useful to all sportspeople, specially to those practising outdoor sports.

10 The materials and dimensions as well as the design of the framework altogether and their details can be any according to demands, and moreover any detail can be replaced by any equivalent one without trespassing the protection field of this patent as described, depicted in the annexed drawings, and hereafter claimed for the specified purposes.

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### CLAIMS

- 1) Spectacles framework **characterized in that** it includes, functionally connected to the arms of the spectacles, some bars, each one supporting an audio diffuser of the type that is commonly defined as earphone, such bars being capable of pivoting and moving to position the audio diffusers to match with the auricle of the person who is wearing such spectacles so as to be enabled to listen to the sound delivered by said audio diffusers connected to a audio generating source.
- 2) Spectacles framework as set forth in claim 1, **characterized in that** the bars are provided, besides the sound diffuser or earphone, also with means for receiving the sounds coming from a sound generator such as a cassette-player, a CD-player, a radio, a computer, TV or other, and with electric energy supply means for such receiving and localized audio diffusing means.
- 3) Spectacles framework as set forth in the preceding claims, **characterized in that** the sound receiving means consist of a miniaturized FM receiver receiving in UHF band (e.g. 433,1 433,2 433,3 mhz) or "within" the band, embedded for instance in the right bar, equipped with rechargeable batteries, realized according to SMD or thick film 'chip' technology, connected to the right channel, and disconnected from the left one, tuned to the same frequency as the stereo FM transmitter transmitting in UHF transmission band (e.g. 433,1 433,2 433,3 mhz) on the same frequency, connected to an audio source, and, in the left bar, a receiver connected to the left channel, and disconnected from the right channel, also tuned to the same frequency as the transmitter.
- 4) Spectacles framework as set forth in the preceding claims, **characterized in that** the stereo FM transmitter, transmitting in UHF transmission band, for instance 433 mhz, is powered by means of miniaturized batteries and/or through the mains, includes a charging system for its own batteries and for those in the bars, and is provided with a case ending with an output jack to be plugged into the sound producing device (cassette-player, CD-player, or other), so that said transmitter transmits on a frequency that is received by the receivers embedded in the bars and supplied by the sound diffusers (earpieces) included in the same bars.
- 5) Spectacles framework as set forth in the preceding claims, **characterized in that**

the bars can even simply embed radio FM "in" band receivers.

6) Spectacles framework as set forth in the preceding claims, **characterized in that** the electric energy supply means consist of preferably, however non exclusively, rechargeable microbatteries.

5 7) Spectacles framework as set forth in the preceding claims, **characterized in that** the electric energy supply means, consisting of microbatteries, are housed in the inside of the bars in proper recesses and/or proper detachable containers.

8) Spectacles framework as set forth in the preceding claims, **characterized in that** the electric energy supply means, consisting of microbatteries, are housed within the  
10 body of the spectacles frame, preferably however non exclusively, within the body of the arms.

9) Spectacles framework as set forth in the preceding claims, **characterized in that** the electric energy supply means can also consist of suitably dimensioned solar panels arranged on the spectacles surface.

15 10) Spectacles framework as set forth in the preceding claims, **characterized in that** at least one, however preferably the two, of the bars are provided with ON, OFF, tuning, volume (ON/OFF circuit) controls.

11) Spectacles framework as set forth in the preceding claims, **characterized in that** the sound receiving means and the electric energy supply means, or any part of  
20 them, can be arranged on the spectacles arms, according to aesthetic and manufacturing requirements.

12) Spectacles framework as set forth in the preceding claims, **characterized in that** the bars are pivoted or hinged to the spectacles arms and, when not in use, they are received by suitable engaging means consisting, for instance, of suitably formed  
25 recesses provided in the spectacles arm, capable of receiving both the earphone and the body of said bar, such recesses being so dimensioned that the body of the bars does not project but minimally from the surface of the spectacles arm.

13) Spectacles framework as set forth in the preceding claims, **characterized in that** the formed recesses, capable of receiving the earphone, consist of circular or  
30 semicircular openings (11) for engaging the earphone supported by the bar.

14) Spectacles framework as set forth in the preceding claims, **characterized in**

**that** the formed recesses receive the entire bar.

15) Spectacles framework as set forth in the preceding claims, **characterized in that** the formed recesses consist of a slot in the arms engaging the upper part of the bar which, in closed position, does not project but partially from the surface of the arm.

16) Spectacles framework as set forth in the preceding claims, **characterized in that** the bars, when not in use, can be received within suitable cavities obtained from the thickness of the arms and accessible from the lower part of the same arms.

17) Spectacles framework as set forth in the preceding claims, **characterized in that** the pivoting movement of the pivoted bars can be either clockwise or anticlockwise.

18) Spectacles framework as set forth in the preceding claims, **characterized in that** said bars can be hinged to the sides of the spectacles arms so as to permit an opening-door-movement from storage position to in use position and vice versa.

19) Spectacles framework as set forth in the preceding claims, **characterized in that** the bars can be provided with suitable engagement means to confer them a tilting movement followed by a rotation when passing from the storage position to in use position and vice versa.

20) Spectacles framework as set forth in the preceding claims, **characterized in that**, in order to facilitate the positioning of the earphone in front of the auditory meatus, each bar can be functionally connected to a multiposition slot provided in the spectacles arm so as to allow a longitudinal displacement of that same bar.

21) Spectacles framework as set forth in the preceding claims, **characterized in that** the earphones can be mounted on telescopic supports and consequently the bars as a whole can be variable in length, within precise dimensional limits, in order to favour a correct positioning of the earphones.

22) Spectacles framework as set forth in the preceding claims, **characterized in that** the pivoting mechanism of the bars can be executed in such a way that a certain pressure on the ear is favoured when they are pivoted, for instance by introducing a suitably dimensioned spring between each bar and its corresponding arm of the spectacles or a rise movement obtained during pivoting in order to impart a slight

inward variation of the pivoting axis of the same bar.

23) Spectacles framework as set forth in the preceding claims, **characterized in that** to favour an optimal listening from the earphones and their ergonomic positioning in front of the auditory meatus, the earphones can present a protrusion,  
5 either directly on the same earphones or on the supporting bars.

24) Spectacles framework as set forth in the preceding claims, **characterized in that** the bars can bear raised points such as surface embossings or provide a raiser, or a microlever that can be of help to the fingers of the user for seizing them.

25) Spectacles framework as set forth in the preceding claims, **characterized in that** the engaging means for the pivoted coupling between the bars and the relevant  
10 spectacles arms can be of any type.

26) Spectacles framework as set forth in the preceding claims, **characterized in that** in case of lead connection or copper connection core, the electronic connection between the parts (the bars to the spectacles arms and the arms to the brow piece of  
15 the spectacles) is preferably made with miniaturized coaxial male-female connectors simultaneously serving as passing connection between the audio leads and as a hinge both for the bar, that pivots with respect to the arm through the mutual rotation of the coaxial connectors and for connecting the arms to the framework, the coaxial connection simultaneously serving as a hinge for pivoting the arms with respect to the  
20 brow piece and as protected sound transmission mean.

27) Spectacles framework as set forth in the preceding claims, **characterized in that** in the bar pivoting pivot is embedded a conducting contact which, besides pivoting within the seat provided to this purpose in the spectacles arm, also acts as charging connector once plugged into a battery charger, for instance into the one  
25 provided in the employed audio transmitter.

28) Spectacles framework as set forth in the preceding claims, **characterized in that** the pin around which the bar pivots consists of a male-female jack connection.

29) Spectacles framework as set forth in the preceding claims, **characterized in that**, when the connection system between the earphones and the audio source is  
30 realized by means of conducting leads or equivalents, mostly when the spectacles frame is obtained by injection technique, the circuitry is mounted in a profile provided

to this purpose, and the latter is then introduced by pressure or snapped into the same frame, where the corresponding recesses, capable of containing and retaining said profile, will have been prepared in advance.

30) Spectacles framework as set forth in the preceding claims, **characterized in**  
5 **that** the spectacles frame can be realized by means of injection moulds and that the arms are realized in a pair of semicases or semibodies prearranged for housing the electronic components, that after introducing said electronic components the two semicases or semibodies are put together and welded to each other, by means of ultrasound or other suitable technique, and that the bars obtained in this way are  
10 connected to the arms of the spectacles that are suitably formed to receive them.

31) Spectacles framework as set forth in the preceding claims, **characterized in**  
**that**, when the connection system between the earphones and the audio source is realized by means of lead-wiring or equivalent means, the lead ending with a jack connecting the sound generator (cassette-player, CD-player or other), when not in  
15 use, is received inside the spectacles framework, preferably within one of the arms, wound on a reel equipped with return spring means.

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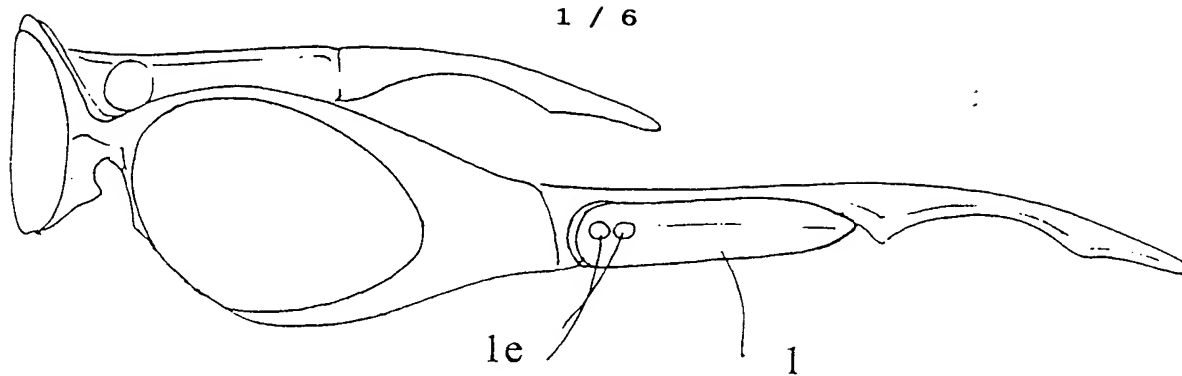


FIG. 1

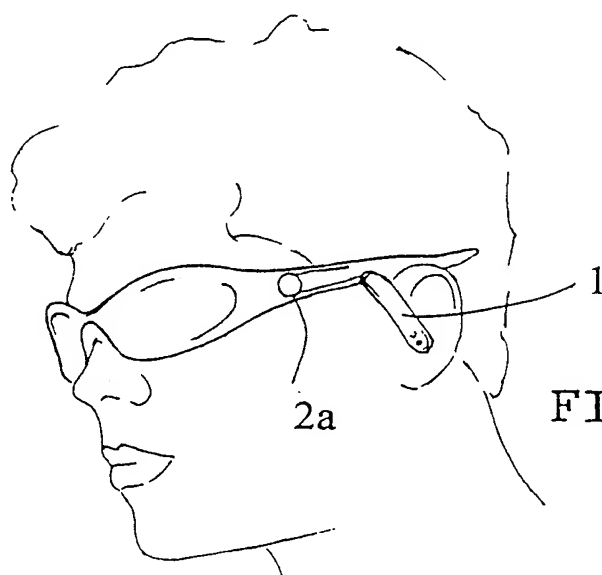


FIG. 1a

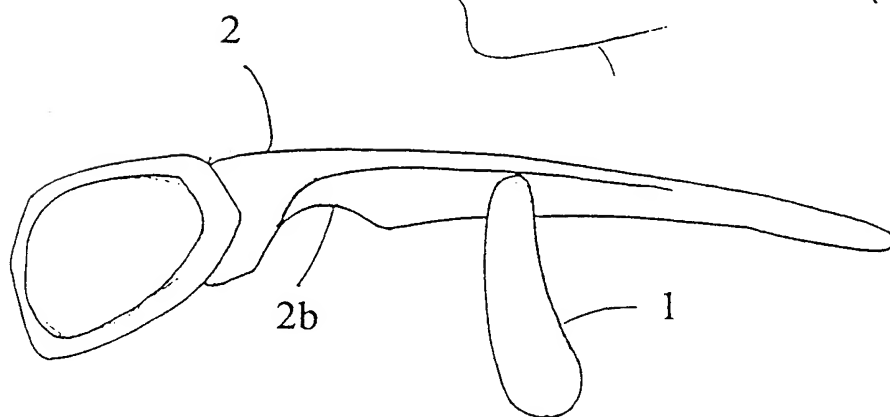


FIG. 2

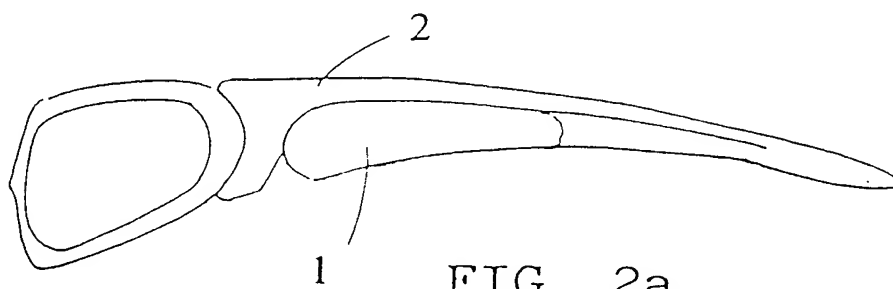


FIG 2a



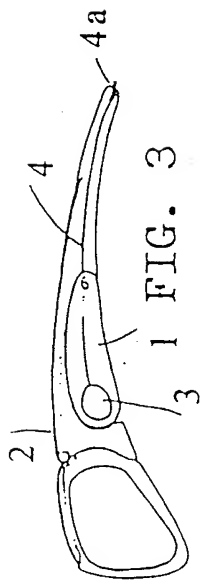


FIG. 3a

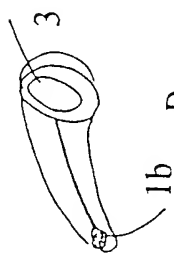


FIG. 4

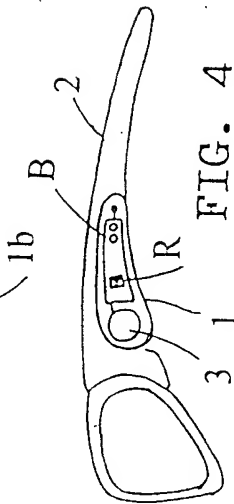


FIG. 4a

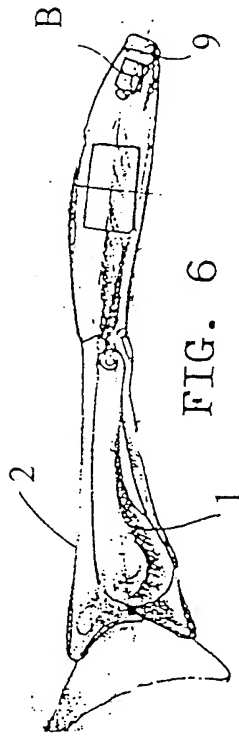
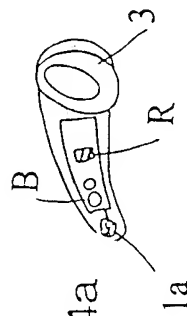


FIG. 6

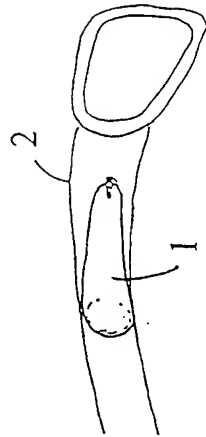


FIG. 7

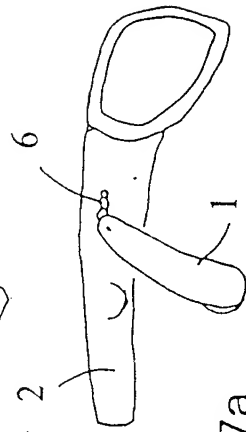


FIG. 7a

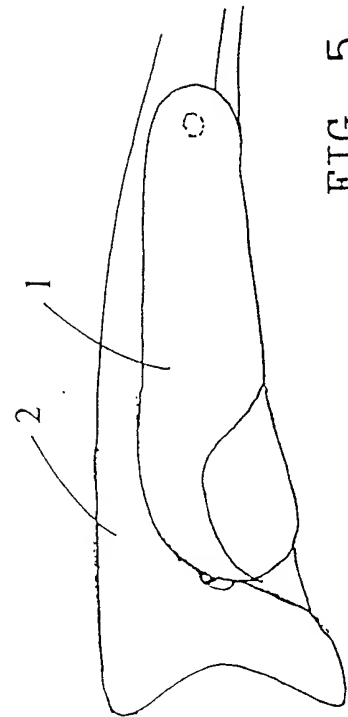


FIG. 5

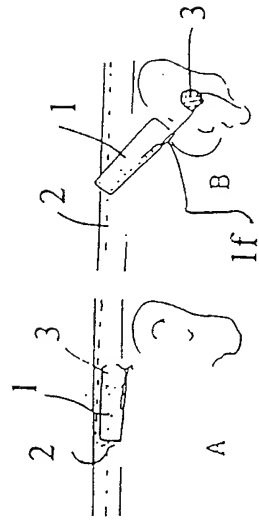
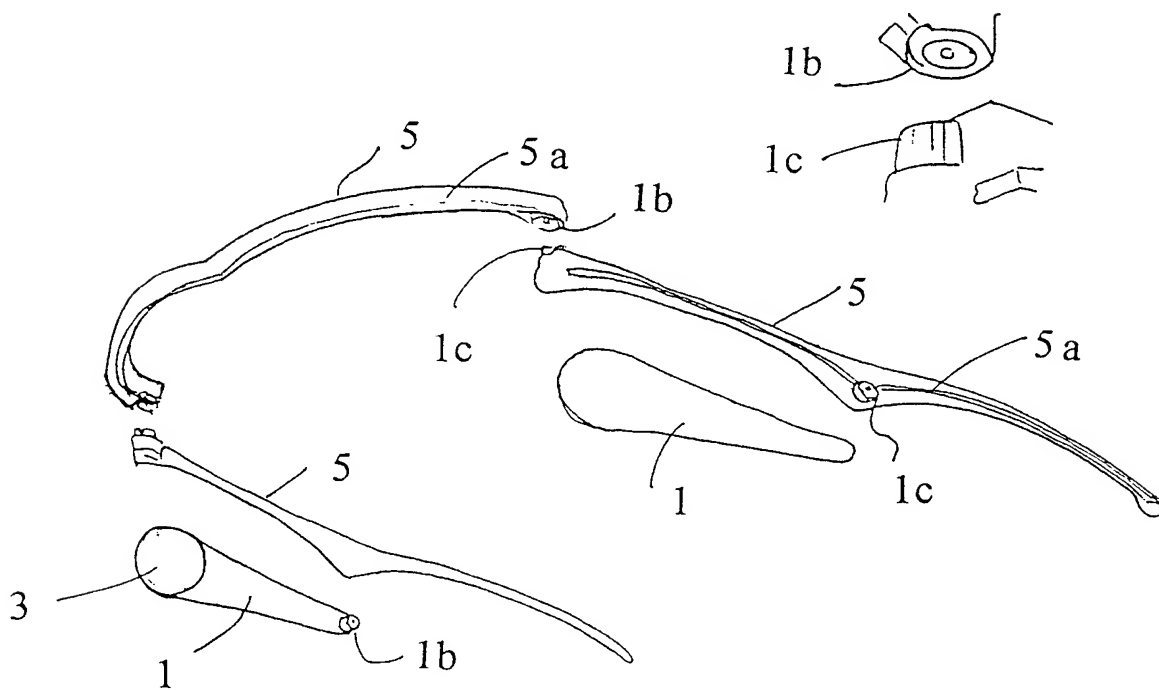
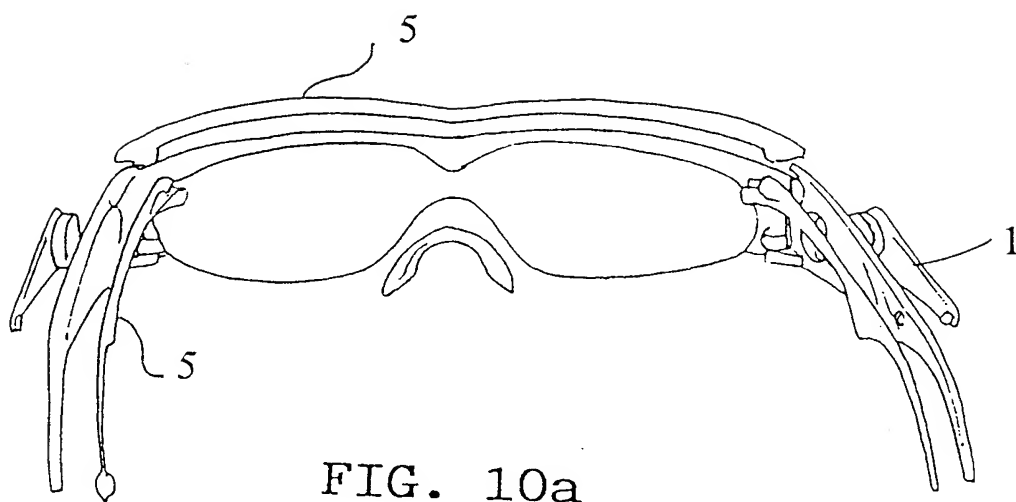


FIG. 8



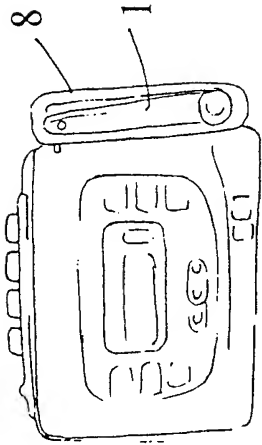


FIG. 9

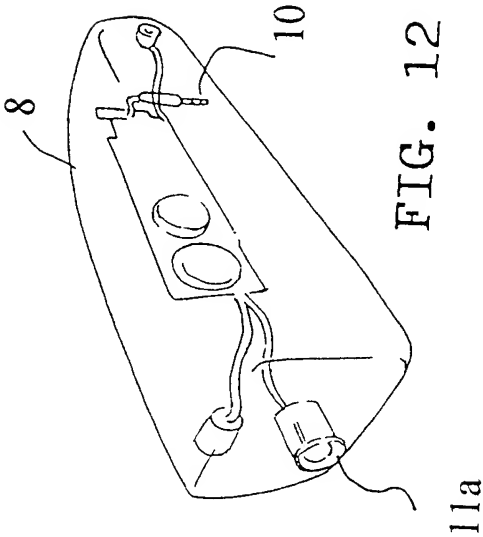


FIG. 12

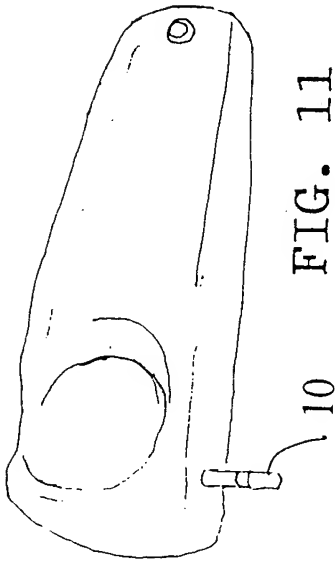


FIG. 11

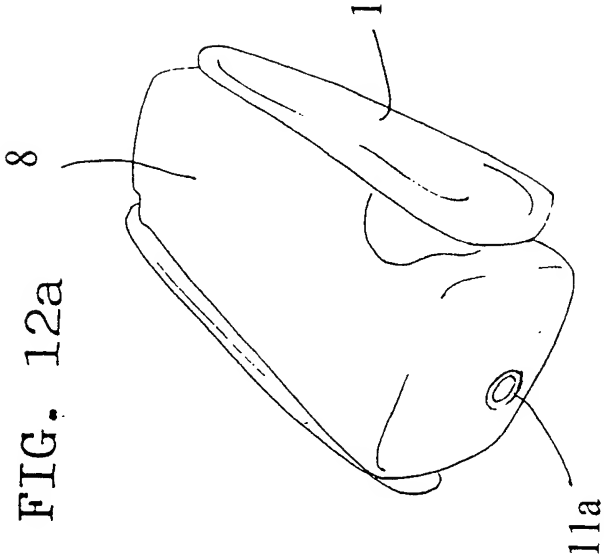


FIG. 12a

FIG. 13

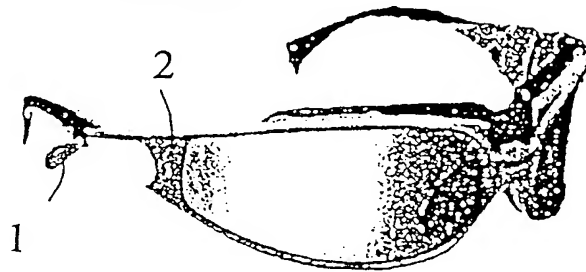
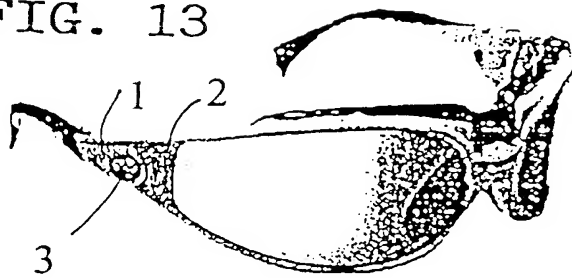


FIG. 13a

FIG. 15a

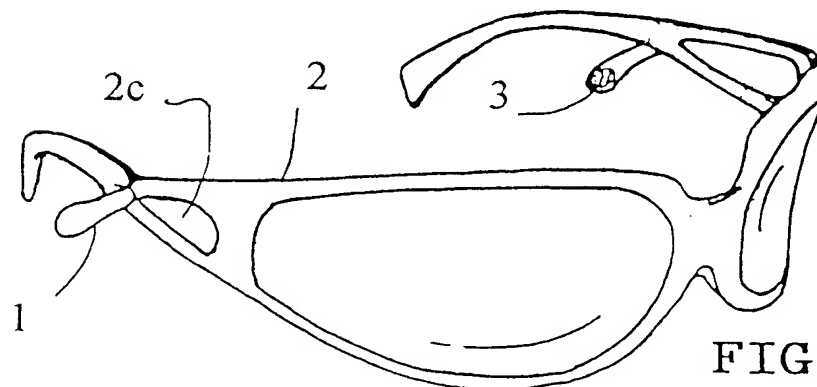
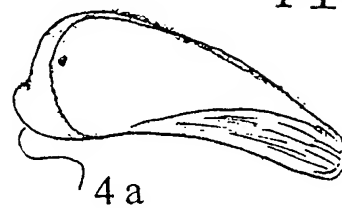
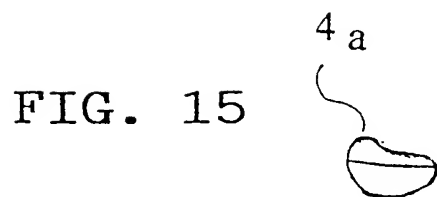


FIG. 16

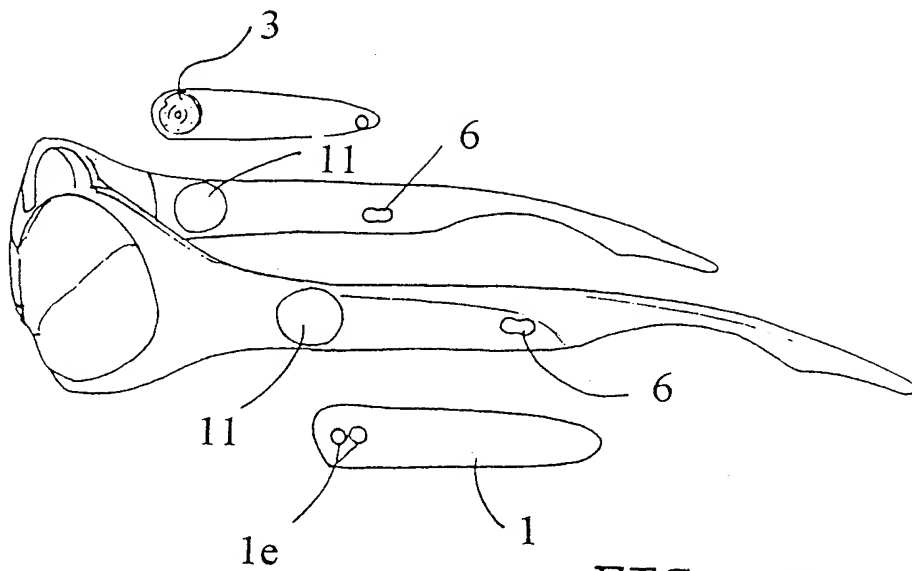


FIG. 14

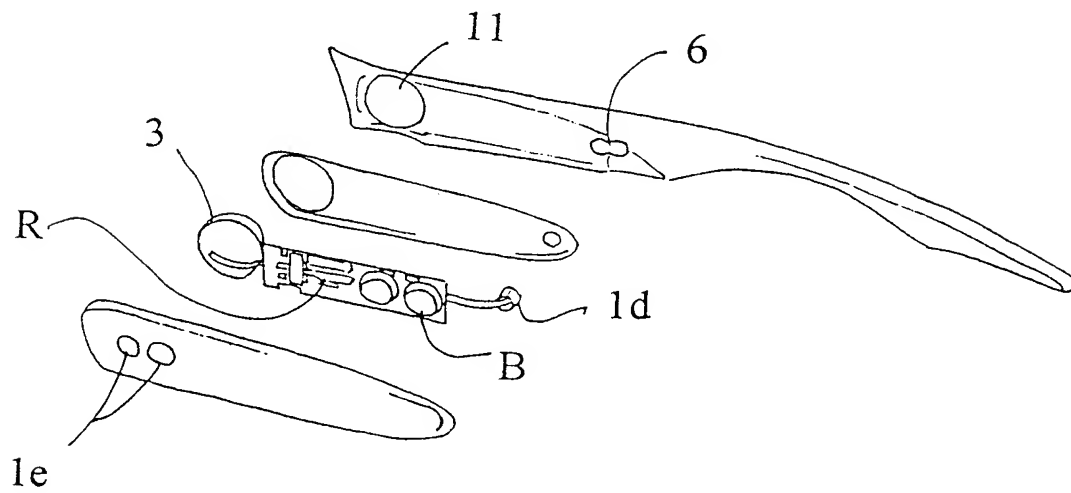


FIG. 14a

# INTERNATIONAL SEARCH REPORT

In. ational Application No

PCT/IT 99/00074

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 6 G02C11/06 H04R1/10

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 G02C H04R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 96 23373 A (HAYNES PHILIP ASHLEY) 1 August 1996 (1996-08-01) page 10, line 19 - page 15, line 10 ----	1-29
A	GB 1 183 487 A (AKUSTISCHE U. KINO-GERÄTE) 4 March 1970 (1970-03-04) page 1, line 28 - page 2, line 118 ----	1-31
A	US 5 335 285 A (GLUZ JACOB) 2 August 1994 (1994-08-02) abstract ----	1
A	DE 86 17 136 U (H.D. WEIDEMANN) 21 August 1986 (1986-08-21) claims ----- -/--	1

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

15 July 1999

Date of mailing of the international search report

22/07/1999

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CALLEWAERT, H

# INTERNATIONAL SEARCH REPORT

In. ational Application No

PCT/IT 99/00074

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 206 014 A (FANFARE GROUP PLC) 21 December 1988 (1988-12-21) abstract ----	1
A	EP 0 579 238 A (BALLEIN BURKHARD) 19 January 1994 (1994-01-19) column 1 - column 2, line 8 ----	1
A	US 4 901 355 A (MOORE MICHAEL R) 13 February 1990 (1990-02-13) abstract -----	1

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Information on patent family members

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